FARNELL

INSTRUCTION MANUAL
FOR

STABILISED POWER SUPPLY UNIT
TYPES MW AND MX

ISSUE 2

FARNELL INSTRUMENTS LTD. SANDBECK WAY, WETHERBY, YORKS.
TEL. (0937) 3541/8

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TYPES MW AND MX

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FARNELL INSTRUMENTS LTD.
Sandbeck Way, Wetherby, Yorkshire LS22 4DH
Telephone Wetherby 0937 3541/6

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SECTION I

INTRODUCTION

The MW and MX type power supply units provide stabilised D.C. voltage output in the following ranges :—

Unit	Output Voltage Range	Maximum Output Current
MW05	15—30	0.5A
MW1	5—15	1A
MX1	15—30	1A
MX2	5—15	2A

Overload protection is provided by current limiting circuitry which keeps the output approximately constant on overload. The unit automatically resets on removal of the overload.

The unit will operate from 220 or 240 volts, 50/400 Hz. (alternative units are available for operation from 110 or 115 volts, 50/400 Hz).

The unit is small and compact and of sub-unit form suitable for incorporation into other equipment.

SECTION II

OPERATING INSTRUCTIONS

Connection to the mains is via the terminal block on front panel of the unit. The live lead should be connected to the terminal marked "L," the neutral lead connected to "220" or "240" terminal according to mains supply voltage, and the earth lead to the "E" terminal.

D.C. output is taken from the terminals marked "O/P+" and "O/P—" on the front panel.

Output voltage adjustment is by means of "Coarse" (P1) and "Fine" (P2) controls situated on the circuit board.

SERIES OPERATION

Units may be connected in series to provide higher voltage output, but diodes capable of carrying the full load current must be connected across each output in such a manner as to reverse bias them under normal operating conditions (i.e. cathode to positive output terminal).

PARALLEL OPERATION

Units set to approximately the same output voltage may be connected directly in parallel. On increasing load the unit having the highest output voltage will carry the load, until it current limits, thereafter the unit having the next highest voltage will supply the extra current, until it limits, and so on. A typical output characteristic is shown in fig. 2. The characteristic shows a series of descending steps in output voltage at the current limit points of individual units, the amplitude of the step depends on how closely the output voltages have been set, and it may not be possible to adjust this to better than 50mV.

It is recommended that no more than three units are parallelled in this way.

SECTION III

CIRCUIT DESCRIPTION

The circuit employs a series regulator transistor driven via an emitter follower from a differential amplifier, which compares the voltage of a zener diode reference with a proportion of the output voltage derived from a resistive potential divider.

The mains supply is connected to transformer MT1 via fuse F1. The main secondary winding supplies a bridge rectifier, reservoir capacitor system, which provides the main unregulated D.C. line. The positive line is connected via the series regulator transistor to the positive output terminal. The negative line is connected to the negative output terminal.

Supplies for the amplifier and reference system are derived from the auxiliary 28 volt secondary winding via rectifier diodes D5 and D6, and smoothed by capacitor C1. The unstabilised reference line across C1 is fed to the zener diode stabilising network R1, Z1, R2, Z2, which provides a +10–0– – 5V. supply for the differential amplifier. R3 supplies current to the main reference zener diode Z3, and potential divider chain R4, P1 and P2.

The base of VT2 and negative of Z3 are connected to the positive output terminal. Z3 therefore gives a voltage positive with respect to the positive output line. R4 is connected between the positive Z3 and VT1 base. Signal voltage between VT1 and VT2 bases is amplified at the collectors of VT2 and VT3, VT3 being a high impedance collector load, whose dynamic impedance is varied by VT1. The signal is then applied via R7 and the emitter follower VT5, to the series regulator VT6 in such a sense as to oppose the original signal at VT1 and VT2 bases. The action of the loop is therefore to maintain zero signal between VT1 and VT2 bases. Output voltage is determined by :—

$$\frac{\text{Vref. (P1 + P2 + R14)}}{\text{R4}}$$

Overload protection is provided by VT4, the base of which is connected to potential divider R8 and R17 connected between the series regulator base and the output terminal.

When output current is low, VT4 is non-conducting since the voltage at its base is negative with respect to the positive output. As output current increases, the voltage across R9 increases, and the junction of R8 and R17 becomes more positive, causing VT4 base to become more positive. With increasing load this process continues until VT4 starts to conduct. This diverts some of the drive current from VT5 base and the output voltage starts to fall.

As the output voltage falls, the — output terminal becomes more positive with respect to the + output terminal, and hence the base of VT4 becomes more positive, since current through R17 is reducing. This drives VT4 further into conduction and reduces the output current. Thus with increasing overload the output voltage and current fall until at short circuit the output current is defined by the value of resistor R10. On 15 volt units the action is the same until the unit output voltage falls to 5V on overload. At this point D7 begins to conduct, thus reducing the voltage of the negative 5V auxiliary rail, and reducing the slope of the overload V/I characteristic.

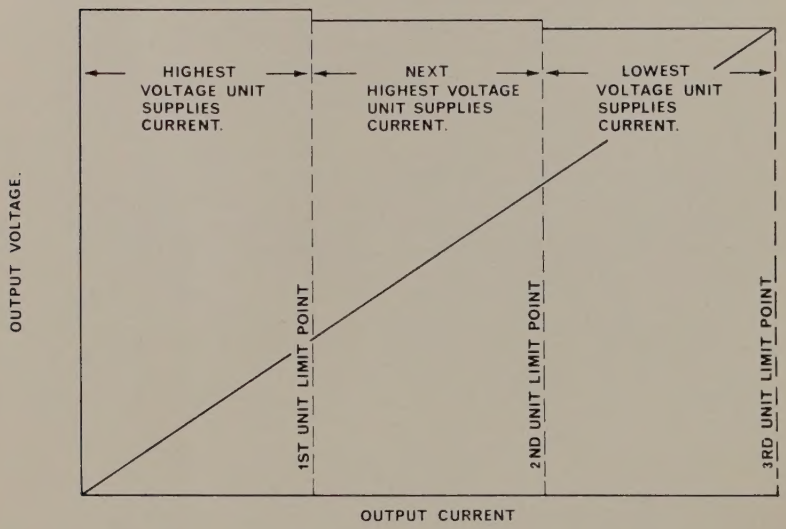

HIGHEST VOLTAGE UNIT SUPPLIES CURRENT.
NEXT HIGHEST VOLTAGE UNIT SUPPLIES CURRENT.
LOWEST VOLTAGE UNIT SUPPLIES CURRENT.
OUTPUT VOLTAGE.
1ST UNIT LIMIT POINT
2ND UNIT LIMIT POINT
3RD UNIT LIMIT POINT
OUTPUT CURRENT

Fig. 2 PARALLEL OPERATION.

SECTION IV

SPECIFICATION

Mains Input :

0–220–240V. at 50/400 Hz. (alternative unit : 0–110–115V. at 50/400 Hz.).

Output Voltage and Current Ranges :

Unit	Output Voltage Range	Maximum Output Current
MW05	15—30	0.5A
MW1	5—15	1A
MX1	15—30	1A
MX2	5—15	2A

Output voltage adjustment by means of coarse and fine Potentiometers.

Output Change for Zero to Full Load Change :

Less than 15mV.

Output Change for ± 10% *Mains Change :*

Less than 3mV.

Ripple Voltage at Full Load :

Less than 1mV. r.m.s.

Overload Protection :

Current limiting and cut back circuitry.

Mains variation Tolerated :

± 10% of nominal.

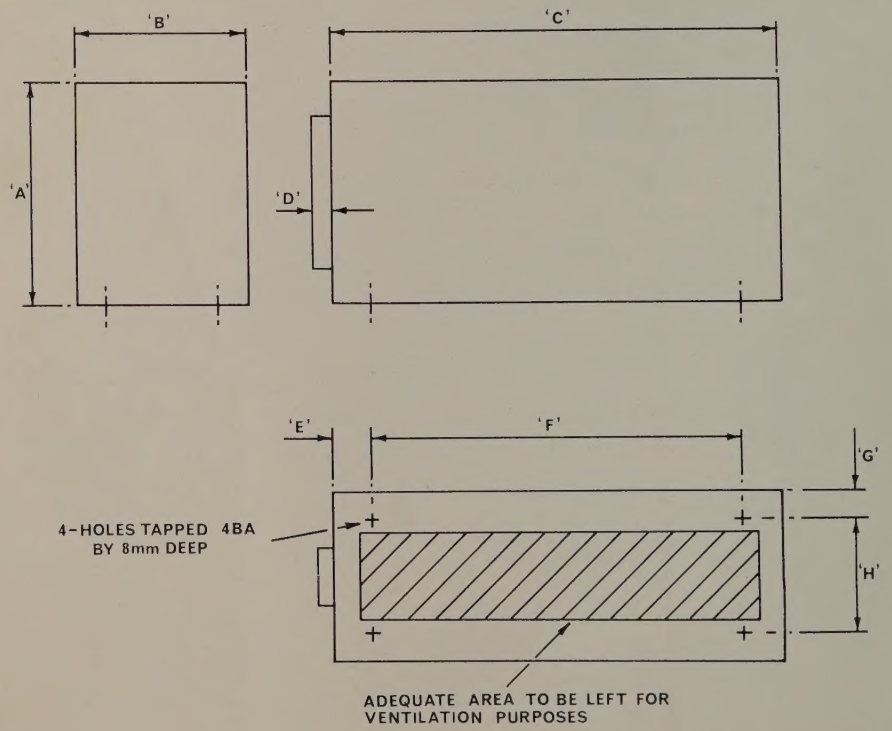
Maximum Operating Temperature :

60°C.

SECTION V

OVERALL SIZES AND FIXING DIMENSIONS FOR "M" RANGE OF POWER SUPPLY UNITS

Package Size	A	B	C	D	E	F	G	H
MWO 5	76·5	61·5	131·5	10	16·5	98	6·5	48·5
MW 1	76·5	61·5	131·5	10	16·5	98	6·5	48·5
MX 1	91·5	87	178·5	10	24·5	132	7·5	72
MX 2	91·5	87	178·5	10	24·5	132	7·5	72



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Fredk. Duffield & Sons Ltd.,
421, Kirkstall Road, Leeds,
LS4 2HA.